Summary of Changes

to

P 440.1-5
NETL Fire Extinguishing Systems, Including Fixed Systems and Portable Fire Extinguishers

Revised Version Issued as P 440.1-5A of 6/2/03

NETL Procedure 440.1-5, NETL Fire Extinguishing Systems, Including Fixed Systems and Portable Fire Extinguishers, of 7/5/01, has undergone revisions. The revisions to the Procedure include (1) standardization of the quality control requirements, (2) upgrade definitions to be consistent with the current organization, and (3) modifications to the Procedure section to ensure requirements are current. Please replace NETL Procedure 440.1-5 with NETL Procedure 440.1-5A.

U.S. Department of Energy

National Energy Technology Laboratory

PROCEDURE

P 440.1-5A

DATE: 6/2/03

SUBJECT: FIRE EXTINGUISHING SYSTEMS, INCLUDING FIXED SYSTEMS AND PORTABLE FIRE EXTINGUISHERS

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1. PURPOSE. To document the requirements, responsibilities, and processes for the use of portable fire extinguishers and fixed fire extinguishing systems.

2. CANCELLATION. NETL Procedure 440.1-5, NETL Fire Extinguishing Systems and Portable Fire Extinguishers, of 7/5/01.

3. REFERENCES.

   a. DOE Order 420.1, Facility Safety.

   b. DOE Guide 440.1-5, Fire Safety.

   c. NETL Order 440.1, Safety and Health Program.

   d. NETL Form 442.1-42/1, Special Work Permit.

   e. Statutory ES&H Standards:

      (1) 29 CFR 1910.157, Portable Fire Extinguishers.

      (2) 29 CFR 1910.158, Standpipe and Hose Systems.

      (3) 29 CFR 1910.159, Automatic Sprinkler Systems.

      (4) 29 CFR 1910.160 and 29 CFR 1926.156, Fixed Extinguishing Systems, General.

      (5) 29 CFR 1910.161, Fixed Extinguishing Systems, Dry Chemical.

      (6) 29 CFR 1910.162 and 29 CFR 1926.157, Fixed Extinguishing Systems, Gaseous Agent.

      (7) 29 CFR 1910.163, Fixed Extinguishing Systems, Water Spray, and Foam.

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f. Reference ES&H Standards:

(1) NFPA 10, Portable Fire Extinguishers.

(2) NFPA 11A, High Expansion Foam Extinguishing Systems.

(3) NFPA 12, Carbon Dioxide Extinguishing Systems.

(4) NFPA 13, Installation of Sprinkler Systems.

(5) NFPA 14, Installation of Standpipe and Hose Systems.

(6) NFPA 15, Water Spray Systems.

(7) NFPA 16, Deluge Foam-Water Sprinkler Systems and Foam Water Spray Systems.

(8) NFPA 17, Dry Chemical Extinguishing Systems.

(9) NFPA 18, Wetting Agents.

(10) NFPA 101, Life Safety Code.

4. DEFINITIONS.

a. Carbon Dioxide -- A colorless, odorless, electrically nonconductive inert gas (chemical formula CO_2) that is a medium for extinguishing fires by reducing the concentration of oxygen or fuel vapor in the air to the point where combustion is impossible.

b. Class II Standpipe System -- A 1½-inch hose system that provides a means for the control or extinguishment of incipient stage fires.

c. Class III Standpipe System -- A combined system of hoses for use by employees trained in its operation which is capable of furnishing effective water discharge during the more advanced stages of fire (beyond the incipient stage) in the interior of workplaces. Hose outlets are available for both 1½-inch and 2½-inch hoses.

d. Class A Fire -- A fire involving ordinary combustible materials such as paper, wood, cloth, and some rubber and plastic materials.

e. Class B Fire -- A fire involving flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

f. Class C Fire -- A fire involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media.

g. Class D Fire -- A fire involving combustible metals such as magnesium, titanium, zirconium, sodium, lithium, and potassium.

h. Class K Fire -- A fire involving cooking media such as grease, fats, and oils.

i. Dry Chemical -- An extinguishing agent composed of very small particles of chemicals such as, but not limited to, sodium bicarbonate, potassium bicarbonate, urea-based potassium bicarbonate, potassium chloride, or monoammonium phosphate supplemented by special treatment to provide resistance to packing and moisture absorption (caking) as well as to provide proper flow capabilities. Dry chemical does not include dry powders.

j. Dry Powder -- A compound used to extinguish or control Class D fires.

k. Extinguisher Classification -- The letter classification given an extinguisher to designate the class or classes of fire on which an extinguisher will be effective.

l. Extinguisher Rating -- The numerical rating given to an extinguisher that indicates the extinguishing potential of the unit based on standardized tests developed by Underwriters' Laboratories, Inc.

m. FC -- Facility Custodian. Person in charge of facility maintenance and proper function of facility-wide systems in a building.

n. Fire Protection Equipment -- Fire hydrants, standpipes and associated hoses, control valves on piping that supplies water for fire protection, sprinkler system water supplies, sprinkler heads, special types of protection (carbon dioxide, liquid suppression systems), portable fire extinguishers, smoke and heat detectors, alarm and communication systems, and emergency exit lighting.

o. Fire Protection System -- An integrated system of fire protection equipment designed to automatically supply water or another extinguishing agent in the event of a fire and concurrently activate an alarm system.

p. Fixed Extinguishing System -- A permanently installed system, including a single fixed extinguisher that either extinguishes or controls a fire at the location of the system.

q. Foam -- A stable aggregation of small bubbles which flow freely over a burning liquid surface and form a coherent blanket which seals combustible vapors and thereby extinguishes the fire.

r. FPPM -- Fire Protection Program Manager. The designated NETL Manager who has the day-to-day authority and responsibility to administer NETL's Fire Protection Program.

s. Gaseous Agent -- A fire extinguishing agent that is in a gaseous state at normal room temperature and pressure. It has the ability to diffuse readily and distribute uniformly throughout an enclosure.

t. Halon -- A colorless, odorless, electrically nonconductive gas that is a median for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromotrifluormethane.

u. Loaded Stream Charge -- Water-based extinguishing medium that uses an alkali metal salt as a freezing point depressant.

v. Multipurpose Dry Chemical -- A dry chemical that is approved for use on Class A, Class B, and Class C fires.

w. Portable Fire Extinguisher -- A portable device containing an extinguishing agent that can be expelled under pressure for the purpose of suppressing or extinguishing a fire.

x. Pre-Discharge Employee Alarm -- An alarm that will sound at a set time prior to actual discharge of an extinguishing system so that employees may evacuate the discharge area prior to system discharge.

y. RP -- Responsible Person. The person responsible for a process, laboratory, or area. This may be a Facility Custodian (FC), etc., as applicable.

z. Small Hose System -- A system of hose ranging in diameter from 5/8-inch to 1½-inch for use by appropriately trained employees to provide a means for the control and extinguishment of incipient stage fires.

aa. Sprinkler System -- A system of piping designed in accordance with fire protection engineering standards and installed to control or extinguish fires. The system includes an adequate and reliable water supply, and a network of specially sized piping and sprinklers which are interconnected. The system also includes a control valve and a device for actuating an alarm when the system is in operation.

bb. SSC -- Site Support Contractor (Site Operations).

cc. Total Flooding System -- A fixed suppression system that is arranged to automatically discharge a predetermined concentration of agent into an enclosed space for the purpose of fire extinguishment or control.

5. QUALITY CONTROL. The FPPM shall monitor the fire extinguishing equipment program and ensure compliance with the requirements outlined in this Procedure.

6. RESPONSIBILITIES.

a. Line Managers shall:

(1) Ensure effective implementation of the requirements in this Procedure in their respective organizations.

(2) Ensure that employees in their organizations with responsibilities for implementing this Procedure have received training commensurate with their responsibilities.

b. Employees shall use fire extinguishers only when properly trained regarding the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting. Note: Even if trained, employees are not required to attempt to suppress any fire with a fire extinguisher; it is a voluntary activity and should be conducted using best personal judgment.

c. The FPPM or designee shall:

(1) Ensure that only approved fixed extinguishing systems and portable fire extinguishers are used at NETL facilities.

(2) Review and approve all fire protection system requests to ensure that all fixed extinguishing system components and agents and portable extinguishers are appropriate for use on the specific fire hazards they are designed to control or extinguish.

(3) Be responsible for the proper selection (e.g., extinguisher classification and rating) and distribution of portable fire extinguishers considering the type and class of fire hazards associated with a particular work area.

(4) Approve new extinguisher system designs and "change of use" for an area and/or building.

(5) Ensure that all fixed extinguishing systems and portable fire extinguishers are maintained in an operable condition and tested and adjusted as required to maintain proper reliability.

(6) Ensure that fixed extinguishing systems and portable fire extinguishers are serviced, maintained, and tested only by persons properly trained in their designed operation and functions necessary for reliable and safe operation.

(7) Ensure the fire extinguishing equipment is protected from corrosion and mechanical or physical impact.

(8) Ensure that employees are notified and the necessary temporary precautions are taken (e.g., fire watches are established and portable fire extinguishers are made available) to assure employee safety, if a fixed extinguishing system becomes inoperable.

(9) Ensure alternative equivalent protection is provided whenever a portable fire extinguisher is removed from service to be checked or repaired.

(10) Establish and maintain a list of buildings containing fixed extinguishing systems and portable fire extinguishers, including their location within or outside the building.

(11) Provide technical assistance to SSC ES&H specialists, procurement, site support contractors, facility and area custodians, and RPs regarding the selection, use and maintenance of fixed and portable fire extinguishing equipment and systems.

(12) Perform Fire Protection Program Reviews.

d. NETL SSC ES&H staff shall:

(1) Conduct acceptance tests and inspections of fire protection systems.

(2) Approve NETL Form 442.1-42/1, Special Work Permits, required to service and maintain fixed fire suppression systems after determining that all precautions will be taken to minimize the potential for any personal injury or property damage.

(3) Be responsible for monthly inspection of fixed extinguishing systems and/or portable fire extinguishers based on NFPA requirements.

(4) Verify after using fixed extinguishing systems or portable fire extinguishers that the fire protection system and equipment is properly restored for the next use.

(5) Ensure that all fire protection system problems are resolved or referred to the FPPM.

(6) Provide annual training for Security personnel on the operation of the Fire Protection System.

(7) Maintain the site-wide inventory of portable fire extinguishers, including a backup supply so extinguishers that are used or do not pass inspection can be replaced.

(8) Provide technical assistance to the FPPM, procurement, site support contractors, facility custodians, and RPs regarding the selection, use, and maintenance of fixed and portable fire extinguishing equipment and systems.

e. NETL Site Support Contractors shall, consistent with contract terms, task/subtask requirements, and technical direction, implement, within their own workforce and work-place, the requirements set forth in this Procedure.

7. TRAINING REQUIREMENTS.

a. Employees working in areas in which automatic discharge systems utilizing dry chemicals or CO_2 systems shall be provided training in the recognition of the pre-discharge alarms and what actions are to be taken if the alarm activates.

b. Additionally, see the NETL Procedure on Fire Protection Program Training for other applicable training requirements, including training on portable fire extinguishers.

8. DOCUMENT CONTROL. All documentation related to fire protection equipment shall be maintained by the SSC ES&H staff and ES&H Records Center.

9. PROCEDURE.

a. General Requirements

(1) Only approved fire extinguishing equipment shall be permitted for use in NETL facilities. Equipment shall be designed, installed, inspected, and maintained in accordance with NFPA standards.

(2) Portable fire extinguishers and fixed extinguishing systems and their components shall be protected from corrosion and physical or mechanical impact.

(3) Alternate equivalent protection shall be provided whenever a portable fire extinguisher or fixed extinguishing system is removed from service for testing, inspection, or maintenance. Please refer to the NETL Fire Protection Impairment Procedure for further information.

(4) Portable fire extinguishers and fixed extinguishing systems shall be inspected, tested, and maintained in accordance with the following NETL Fire Protection procedures, as appropriate:

(a) Freeze Protection.

(b) Inspection Testing and Maintenance.

b. Portable Fire Extinguishers

(1) Portable fire extinguishers shall be mounted, located, and identified so that they are readily accessible to employees expected to use them.

(2) Portable fire extinguishers shall be maintained in a fully charged and operable condition and kept in their designated location at all times.

(3) Extinguishers shall be selected and distributed based on the classes of potential workplace fires and on the size and degree of hazard.

(4) For portable fire extinguishers to be used on Class A fires:

- The travel distance from the Class A fire hazard area to the extinguisher shall be 75 feet or less.
- Water, foam, loaded stream, Class K, or multipurpose dry chemical extinguishers are acceptable.

(5) For portable fire extinguishers to be used on Class B fires:

- The travel distance from the Class B fire hazard area to the extinguisher shall be 50 feet or less.
- Halon 1301, Halon 1211, acceptable Halon substitutes, Class K, carbon dioxide, dry chemical, foam, or loaded stream extinguishers are acceptable.

(6) For portable fire extinguishers to be used on Class C fires:

- The travel distance from the Class C fire hazard area to the extinguisher shall be 75 feet or less if the area is also a Class A fire hazard area, or 50 feet or less if the area is also a Class B fire hazard area.
- Halon 1301, Halon 1211, acceptable Halon substitutes, Class K, carbon dioxide, or dry chemical extinguishers are acceptable.

(7) For portable fire extinguishers to be used on Class D fires:

- The travel distance from the combustible metal working area (Class D fire hazard area) to the extinguisher shall be 75 feet or less.
- The dry powder-extinguishing agent to be used in Class D fire areas should be approved for use by the FPPM.

(8) For portable fire extinguishers to be used on Class K fires:

- The travel distance from Class K fire hazard area to the extinguisher shall be 30 feet or less.

c. Standpipes, Hydrants, and Hose Systems

(1) Reels or cabinets used to contain fire hose(s) shall be conspicuously identified and used only for fire equipment.

(2) Hose outlets and connections shall be readily identifiable and located high enough above the floor to avoid being obstructed.

(3) The dynamic pressure at the nozzle for all connections shall be between 30 and 125 pounds per square inch.

(4) The minimum water supply for small hose, Class II, and Class III standpipe systems is 100 gallons per minute for a period of at least 30 minutes.

(5) Standpipe hoses shall be equipped with shut-off type nozzles.

(6) Fire hydrants on site shall be kept free of obstructions and always accessible for use by local fire departments in the event of a fire emergency. Please refer to the NETL Non-emergency Fire Hydrant Use Procedure for use of fire hydrants in non-emergency situations.

d. Fixed Extinguishing Systems

(1) General Information

- Fixed extinguishing system components and agents shall be designed and approved by a professional engineer certified for fire protection for the specific fire hazards they are expected to control or extinguish.
- Manual discharge stations for back-up activation of fixed extinguishing systems shall be readily identifiable and located for easy employee access.
- Hazard warning or caution signs shall be posted at the entrance to and inside of, areas protected by fixed extinguishing systems, which use agents in concentrations known to be hazardous to employee safety and health.

(2) Automatic Sprinkler Protection Systems

- Automatic sprinkler systems using water as an extinguishing medium shall be used in all areas as required by DOE Directives with the exception of areas in which the use of water will lead to a potential for a release of hazardous material into the environment, or react with chemicals stored in the area and create a greater hazard than the fire. In these situations another method of extinguishment will be utilized.

- New or replacement sprinkler systems to be installed for fire protection purposes shall be designed and installed in accordance with the NFPA 13, "Installation of Sprinkler Systems."

- Before new sprinkler systems are placed into service, an acceptance test shall be performed and the appropriate adjustments made, as necessary, to ensure proper and reliable operation.

- Automatic sprinkler systems having more than 20 sprinkler heads shall be provided with an audible waterflow alarm.

- The minimum clear vertical and horizontal distance around a sprinkler head to prevent interference of the sprinkler head spray pattern by an obstruction shall be as defined in NFPA 13-5.

- Systems shall be inspected and maintained during periods of sub-freezing temperatures in accordance with the NETL Fire Sprinkler Freeze Protection Procedure.

- Following discharge of a sprinkler system, the Emergency Preparedness On-Scene Commander or Emergency Director shall ensure that the area is properly ventilated and prevent employee entry into the affected area until the atmosphere has been determined as being non-hazardous to employee safety and health.

(3) Dry Chemical, Gaseous Agent, Water Mist Spray, and Foam-Extinguishing Systems

- These type of systems will be utilized in areas that require some form of fire suppression system, but due to conditions of the area being protected, conventional water-based sprinkler systems are not feasible.

- Employees who work around dry chemical, gaseous agent, or foam-extinguishing systems shall be informed of the possible hazards associated with the system and its fire-extinguishing agent.

- Following discharge of a dry chemical, gaseous agent, or foam-extinguishing system, the Emergency Preparedness On-Scene Commander or Emergency Director shall ensure that the area is properly ventilated and prevent employee entry into the affected area, until the atmosphere has been determined as being non-hazardous to employee safety and health.

- Drainage of water spray systems shall be directed away from employee work areas and routes of employee egress.

- A pre-discharge employee alarm shall be required for dry chemical discharge systems that may obscure employee vision and for total flooding systems (e.g., carbon dioxide systems).

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Associate Director, OBL